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THE JOURNAL OF PHILOSOPHY

SCIENCE AND PHILOSOPHY

THE English journal, *Nature,* of June 7, 1930, contains a letter from Dr. F. G. Donnan, professor of chemistry in the University of London, suggesting the desirability and the possibility of an international conference of philosophers and scientists to promote the exploration of the common ground (if there really is any) between them. As one fitting occasion for such a conference, Professor Donnan mentions the meeting of the British Association for the Advancement of Science in 1931, this being the one hundredth anniversary of that famous organization for the promotion of science. It may be noted that this seems the more fitting as a time for the suggested conference in that this meeting of the British Association will be under the presidency of General the Right Honorable J. C. Smuts. From his notable book, *Holism and Evolution,* published four years ago, it is difficult to decide whether General Smuts, having outgrown his rôle as a warrior and statesman, should now be classed as philosopher or scientist.

In the same number of *Nature* there is an editorial discussion of the proposed conference which contains, among other interesting things, some reasons for it and some against it. The point is well made that were such an undertaking to be pitched on too grand a scale it might do more harm than good, so diverse and in some matters so antagonistic are the problems involved. To a later issue of the same journal, Mr. Wilford Trotter contributes an article under the title "Science and Philosophy." After calling attention to the fact that in the two communications just referred to, biology is mentioned but once and then incidentally, the assumption seeming to be that physics and chemistry would be the chief if not the only sciences concerned in the suggested conference; and after remarking that such a thing would hardly have been possible thirty years ago, Mr. Trotter writes: "The occasion indeed brings into sharp prominence the extent to which the biological sciences have, during the last thirty years, lost prestige in the intellectual world, and ceased to influence philosophic thought" (*Nature,* June 21, p. 924). Let anyone who may be dubious about Mr. Trotter's point until he sees it in particular instances, compare Professor John Dewey's *The Influence of Darwinism on Philosophy,* published in 1909, with his *The Quest for Certainty,* published just twenty years later. Very near the heart of the first is the recognition of the intellectually transforming

character of the "genetic and experimental logic" inherent in Darwinism. In the last we find no express reference to this matter and only incidental reference to it even by implication. On the other hand, the physical sciences here receive abundant attention.

If one wants an illustration of the extent of, and the reason for, the "lost prestige" of biology in the humanistic interests of our day, he may find one such in *A Preface to Morals*, by Walter Lippman (1930). Here we come upon several paragraphs given to biologists, the chief purpose of which appears to be to point out that from the "particular point of view which the biologist adopts" man and the rest of the living world is "a mere flicker on the stream of time" and is "no concern of nature's" (p. 150).

The point raised by Mr. Trotter touches the edge of a problem of the utmost importance, it seems to me. With the question of the prestige of biology and of its influence on philosophic thought this article is not primarily concerned.[1] I wish to call attention to what looks to me like a more immediately urgent and humanly significant problem—that of the relation between "exact science" and "natural science." Whether this classification of the sciences plays as great a part in the institutional, the managerial, and the educational aspects of science in all countries as it does in the United States, I am not certain. However that may be, for some reason (seemingly more than anything else from the remarkable achievements of mathematical physics during the last few decades) it has come to pass throughout the learned world that when the word "science" is used by many

[1] While the statement is literally true that this article is not primarily concerned with the relation of biology to "philosophic thought," it seems desirable to indicate thus early in these remarks what my attitude is on the question. The longer I labor in this large vineyard, the more do I find the terms "science" and "philosophy" dropping into the background of my thinking. This is not because there is anything wrong with the words in themselves. Rather, it is in the fact that, although they are obviously aimed at certain ideas which for many years have been gaining a larger place in my interest and efforts, as commonly used they fail to express these ideas adequately.

The ideas referred to center around the word "knowledge." Having clarified my mind on the nature and function of knowledge, I proceed with the task of getting it, recognizing that the doing of it always involves the twofold mental activity of analysis and synthesis. The results are characterizable as analytic knowledge and synthetic knowledge. Then, corresponding to these two classificatorily distinct kinds of knowledge, as a student of nature, I think of myself as analyzing and synthesizing nature,—as an analytical naturalist on the one hand and a synthetical naturalist on the other hand. Finally, in case I feel like expanding to the *ism* size, it is easy to speak of analytical naturalism and synthetical naturalism. Now the analytical aspect of natural knowledge appears to be what the term "science" is chiefly aimed to cover; while the term "philosophy" is really aimed, so far as I can see, to cover the synthetical aspect of natural knowledge. At least such, briefly stated, is the standpoint from which this article has been written.

moulders of thought in whatever departments of human interest, whether it be in literature and other forms of art, religion, morals, economics, sociology, or politics, it means "exact science" and nothing else. So far as today's widely accepted spokesmen for science are concerned, the ideal seems to be that the natural sciences of earlier times should be recognized as sciences only tentatively pending their final reduction to exact science, the ideal of which is atomic physics mathematically treated. And it is important to notice that this ideal does not rest on exactness of count and measure in the full scope of the concept of quantity. Such simple exactness as the five-digited type of limb in land vertebrates; of the 109 inches of wing spread in the California condor as the average measurements of four adult males; or of the one young per year of the European red deer, would not be accepted as data for any reasoning that deserves to be called scientific. Quantities large enough to require, and homonymous enough to admit of, treatment by statistical and equational methods of highly developed mathematics appear to be the *sine qua non* of exact science. But it is certain that the phenomena of living nature are too vast, too variant, too defiant of absolute fixity of law to admit of mathematical treatment alone, mathematical being thus understood.

The imperialistic tendencies of exact science under the chieftainship of mathematical physics is too obvious in our day to be overlooked. Nor could any true naturalist consistently object to this tendency were he to be convinced that such a conception of science really corresponds to nature and not merely to a particular conception of nature. If living nature as one segment of all nature is not so constituted as to be amenable to science thus conceived, one might suppose the present exalted claims of exact science need not be "viewed with alarm," but might be supposed to be self-corrective. Is it not fair to suppose, one might reason, that when more experience shall have cooled somewhat the perfervid enthusiasm caused by the splendid successes of late researches on some phenomena of lifeless nature, exact science will again become more tolerant of the (supposedly) cruder methods of the natural sciences?

I venture to call attention to an aspect of the situation that makes it more serious than such lenient judgment takes account of. The aspect is this: If the theory of evolution as applied to the human species be accepted without qualification—if, that is, attributes characteristic of this species which may be called spiritual are held to be the product of evolution no less certainly than are attributes called physical, then it follows that on such a conception of science as that now being renovated (the roots of the conception are easily traceable to Plato at least; they probably go to Pythagoras) by mathe-

matical physics, there *never can be a real science of man.* A science of esthetics, of ethics, of society, for example, not to mention psychology, is forever impossible under such a conception. For man's identification with living nature generally is distinguished from lifeless nature—and, consequently, his taxonomic place in the animal world identifies his knowledge of himself with natural science.

It is true that no foremost protagonist of exact science has, so far as I have noticed, yet pronounced definitely against the possibility of self-knowledge that is scientific. Apparently a consideration tending to delay such pronouncement is the fact that physical anthropology is susceptible of large development in the direction of exact science. Quantitative determinations of the requisite kind are possible here over a wide range of characters. The osseous portions of the head, for instance, offer a large, easily accessible, important, and inviting opportunity for research. Likewise the human scapula, to mention only one other physical part, is, as recently pointed out to me, available for quantitative studies that point toward results of high interest. Now all this is, so far, wholly commendable. It contributes to man's self-knowledge which for two-and-a-half millennia at least has been recognized as a major requisite to man's highest good.

But notice now the astonishing implication carried by such a conception as that being noticed. There is implied a complete reversal of the Socratic-Platonic interpretation of the Delphic oracle's injunction, *Know thyself,* since by this interpretation man's spiritual nature almost exclusively was subject to the injunction.

Is the situation really as thus indicated? Is the course of reasoning which leads to the statement just made so remote from the daily life and needs of mankind, and so involved as to deprive it of practical value? From my large collection of recent opinions, to the effect that about the higher and highest attributes of man science has nothing to say, I notice two.

Speaking about the present calamity of unemployment, the President of the United States was recently reported in the daily papers as saying in effect that while science in its rôle of handmaiden to industry may do much to increase the opportunities for gaining a livelihood, those parts of our nature which suffer most from uncertainty about, and loss of, means of sustenance, and which manifest themselves in the best of family life, are entirely outside the province of science. These parts of us are, according to this theory, amenable to humanistic, not scientific, treatment. Otherwise expressed, the best parts of our nature are above and beyond the reach of some of the greatest of our efforts as intelligent beings even though these be made in full consciousness of our own welfare! No wonder that

some of the most intelligently humane men and women of our time are driven to the verge of intellectual bankruptcy by such a paradoxical conception of human life.

Turn now to one other sign of the time in the situation: Within the last few weeks a notable book entitled *Toward Civilization* has appeared under the editorship of one of America's best-known and most highly esteemed leaders of historical and political thought, Professor Charles A. Beard. This is a symposium contributed to by sixteen "scientists and engineers." The published biographic sketches of the contributors reveal that "scientists" as here used does not include a single representative of the sciences of living nature. If this book be accepted as presenting a true diagnosis of the prevalent ills of civilization, students and manipulators of lifeless nature as contrasted with those of living nature, are both the bane and the hope of civilization, *so far as students and manipulators of nature are factors at all in civilization.*

The state of anxious bewilderment now widespread among us relative to the general situation, was strikingly illustrated by the lady clerk in the bookstore at which I bought my copy of *Toward Civilization.* "This is an interesting book she said (somewhat hesitatingly), because it is written by scientists; and scientists, we think, are destroying instead of making civilization." Now I do not presume for a moment that the "we" who spoke through this lady would be a whit less bewildered in thought and hostile in attitude toward scientists had the authorship of the book been divided fifty-fifty between physicists and biologists. There are two things about such humanistic outbursts against science that sorely need heeding. One is that such justification as they have are largely due to imperfections in science itself. The other is that for the removal of the imperfections science itself is first and chiefly responsible. The major problems of human life have outgrown traditional philosophy and ethics.

The main reason, I am quite sure, for biology's "lost prestige," in America at least, is less from its inability to "influence philosophic thought" than from its relative inability to contribute to prosperity. And prosperity with us to-day is *material* prosperity, the assumption being that there is no other prosperity—or, if there is, it is only an inclusion in, and a subordinate to, the "real thing."

But distressingly inadequate as this book should be felt to be by anybody who should fail to grasp the full implication of the word *toward* in its title, yet the main purpose of it, if I interpret it correctly, is excellent. "Toward" Civilization leaves wide open the question of how far toward.

Any real participant in the material prosperity of present-day

America who should declare point blank his disbelief that there is a thing in it all that is "toward civilization" could be safely set down as either mostly fool or mostly liar. But whether this aspect of Americanism is toward or away from civilization, certain it is that scientists and engineers are front-rankers among those who are responsible for it. Even the mighty holders of the purse strings are fast coming to recognize their relative impotency without the aid of these technologists. But a large and growing number of Americans, though grateful beneficiaries of this prosperity, are learning to their consternation that the replacement of poverty by wealth may be merely the replacement of one kind by another kind of filth, squalor, and hideousness; and of disease and degeneracy, physical and spiritual. Experience is surely justifying the query as to whether any ill that may arise from too little material wealth may not have a counterbalancing ill arising from an excess of such wealth.

This contradictoriness that is proving such a terribly persistent accompaniment of quantitative and mechanical culture, appears to have impressed itself with special force on Professor Beard. He seems to have recognized more clearly than anyone else has that the "scientists and engineers," noblest of creators or arch destroyers, depending on which extreme of judgment one listens to, should have a chance to speak for themselves as human beings and not merely as technologists. The sole fault to be found with Professor Beard (though a grave one if appearances are an index to the truth of his position) is his acceptance of the claims of atomic physicists to be the only authoritative spokesman for science. Even for him, it appears that between man's knowledge of the phenomena of lifeless nature and his knowledge of the phenomena of his own nature there is no chance for a kind of knowledge that can properly be called science. Between science as reasoned knowledge of inanimate nature, and "humanism" as emotion tinged with reason, there is a chasm that can neither be filled nor bridged either by emotion or reason or the two combined. The belief confidently held a century ago that this chasm might be filled by a body of knowledge that could be appropriately named biology has been proved fatuous by late discoveries in that branch of physics which lies almost wholly beyond the range of sensory experience. And so it comes to pass, according to this view, that belief in an invisible world, a world which supernaturalistic philosophy, i.e., theology, has long held to be the only real world, wins the mighty backing of science. But the science thus won over, it can not be too carefully noticed, is "exact science," not "natural science." Natural science is that department of human knowledge which is concerned first and foremost with the part of the sensory-experienceable world which is always present, is everywhere, and can never be fully escaped.

The coincident tendency in our day to exclude the natural sciences from the domain of true science, and the lost prestige of the biological sciences in the intellectual world are, I venture to maintain, causally related. The situation is so unfortunate, but yet so complex, as to amount almost to a stunning impasse. Nevertheless it can, I think, be shown to be susceptible of discussion with freedom from effort or even wish, to attach blame to any particular department of knowledge or professional group, simply from the fact that it is due to basic imperfections in our practice and theory of getting and of using natural knowledge. And I am prepared to present what seems to me strong reasons for believing there is now before us an open field for a type of effort in science which might prove a powerful ground-gainer toward civilization beyond the exceedingly important gains already made by "science and engineering." The purpose of this article is to point toward the field which invites this effort.

The supreme need not merely of modern science but of modern culture is such an overhauling and reconstruction of our conceptions of the science as shall leave no scrap of justification for the classification of the sciences into "exact" and "natural" with the meaning now attached to these terms.

Even a mere allusion to this vast matter can not entirely neglect the historic aspect of it since the entire problem of the nature of man and of all nature is involved. Or, stated in other and more weighty words, the problem, old as human culture itself, of Nature versus Beyond-and-Above-Nature is what is on our hands. We are at last near the kernel of the problem that had its modern opening when *The Origin of Species* and the other works of Charles Darwin, particularly *The Descent of Man,* and *The Expression of the Emotions in Men and Animals,* were given to the world. Too long has the defining of nature been left to men who were in no strict sense students of nature. As a consequence, Naturalism of the schools has been and still is very largely defined by men not seriously interested in nature; or, still worse, by men who were or men who are really hostile to nature. But the march of time and events has finally brought the day when nature may be defined by those who have detailed, sympathetic knowledge of her. Though by no means easy, the task is alluring since its performance will be in the company and spirit of Goethe and Alexander von Humboldt; of Voltaire and Lamarck; of Linnaeus and Cuvier; of the Darwin family; of Thoreau and the Agassizes, Louis and Alexander; of Jefferies, Muir, and Burroughs; and of many others which lack of space, not lack of inclination, forbids the naming.

One item in the historic aspect of the problem to which I have

often referred I must now mention again. It is the views expressed by William Whewell on the relation between the "exact" and "natural" sciences. In 1847 Whewell wrote: "The mathematical and mathematico-physical sciences have, in a great degree, determined men's views of the general nature and form of scientific truth; while natural history has not yet had time or opportunity to exert its due influence upon current habits of philosophizing" (*History of Scientific Ideas,* ed. 2, London, John W. Parker & Son, p. 121). From his return again and again to this matter, it is clear that Whewell was much impressed by it. Once again thus: "Natural History *ought to form a part of intellectual education, in order to correct certain prejudices which arise from cultivating the intellect by means of mathematics alone; and in order to lead the student to see that the division of things into kinds, and the attribution and use of names are processes susceptible of great precision*" (italics as in the original) (*Novum organum renovatum,* London, John W. Parker & Son, 1858, p. 164).

Although Whewell was in a sense right in attributing the relative backwardness of natural history to lack of time and opportunity for development, it can be shown, I am quite sure, that to bring natural science into right relation to "habits of philosophizing" was exactly the inspiration of the most distinctive and important of all Aristotle's works regardless of the particular problem to which he set his mind and hand. That he fell far short of fully accomplishing his aim detracts nothing from the significance of his having seen rather clearly what needed to be done and having made a mighty effort to do it.[2]

From his nineteen or twenty years of study in the Academy, Aristotle undoubtedly became deeply and lastingly impressed with the universalizing power of the human mind as a factor in the acquirement of human knowledge and the relation of such knowledge to human good. But the historic evidence is now nearly conclusive that he also became impressed with the inadequacy of Plato's theory of Ideas as the basis of this knowledge. Sense data and the external world must, he saw, have a more fundamental place in the business than the Platonic doctrine makes adequate allowance for.

For one thing, Aristotle seems to have convinced himself that the famous Delphic injunction to self-knowledge (Γνωθι σαντόν) had its tap root in the recognition of the bodily strength, health, and

[2] Several recent investigations of the Aristotelian problem have contributed very importantly to our knowledge of Aristotle's labors toward synthetic naturalism. D'Arcy Wentworth Thompson, W. D. Ross, and Charles Singer deserve special mention in this connection. But as to some of the most crucial aspects of the problem, Werner Jaeger in his *Aristoteles Grundlegung einer Geschichte seiner Entwicklung* is the most important.

prowess of athlete participants in an ancient festival to Apollo, at least as much as in recognition of the souls of the athletes. In other words, Aristotle found that the ethical, half-mystical ideas which had come to dominate the injunction in the Socratic-Platonic teaching was not justified by its origin and earlier use.

Accordingly, having left Athens after the death of Plato, Aristotle apparently set himself resolutely to studying the particulars as well as the universalities of animal life generally as exhibited by sub-human as well as by human animals. The zeal, the industry, and the effectiveness (for the age) with which he applied himself to the investigation of sub-human animals, especially during his residence on the island of Lesbos where he had easy access to the luxurious fauna of the Aegean Sea, can be fully appreciated only by marine zoologists who have specialized in the very groups of animals on which he prosecuted his most original and careful investigations.

But I hazard the opinion that the significance of Aristotle as a natural scientist, acknowledged though he is by all zoologists as the unquestioned and supremely able ground-breaker in many of the main subdivisions of their science, can not be grasped by viewing him primarily as naturalist, or zoologist, or biologist in the specialized modern sense of these terms. His innate naturalism (probably through his Ionian heritage) might account in part for his devotion to zoology. But he was Greek as well as Ionian. Hence he was as innately "humanistic" as he was "naturalistic." Furthermore, he was under the mighty influence of the humanistic teaching of Plato and the Academy. Since, however, he had not even a tradition adverse to viewing man as animal, it was the most natural thing in the world for him to recognize that if the great injunction "know thyself," was ever to become really potent for human good, the one and only direct natural road of such knowledge must be comparative zoology, man himself being the highest member of the series to be studied. Aristotle's humanism as a phase of his naturalism explains in large part, we may suppose, his turning to zoology for his supreme interest and effort in natural science.

One angle more may be touched in concluding. Probably in none of Aristotle's writings does his recognition of man as animal find more constant and naïve expression than in the *Organon.* How endlessly he plays on the idea of animal as genus of which man is one species! That ox, for instance, is another familiar species of the same genus, he mentions with delicious naïveté (genus and species in the sense, of course, of formal logic). But never does the utilization of this familiar example of genus and species evince the least doubt about the truth or propriety of the example. Indeed its certainty and familiarity make it specially useful for illustrating all sorts of applications of the species-and-genus concept.

But Aristotle appears to have had nothing more than the faintest glimmer, if he had that, of the phylogenetic relation between different species and genera such as is a corollary of the evolution theory. Consequently nothing he has given us in the several writings which constitute the *Organon* provides an adequate basis in logic and the theory of knowledge for dealing with the phenomena of "descent with modification." Nor has such a basis yet been provided so far as I can discover. Notice was taken above of Professor Dewey's recognition that the theory of evolution must profoundly affect logic. At first thought it is rather surprising to find that in both the essays noticed, that treating of Darwin's influence on philosophy, and in other writings, Dewey seems to assume that he at least has reshaped his logic and theory of knowledge in conformity with the new outlook upon living nature. But his late book (mentioned above) furnishes convincing evidence that he still lacks much of having accomplished such a reshaping. Nor on second thought does this appear surprising. For was it not full eighteen centuries after Aristotle did his great work as a groundbreaker in the science of living nature before other laborers in this field came fully to appreciate what he did and tried to do? And not even yet have laborers in other fields come to such appreciation. But it is scarcely three quarters of one century since the conception of the origin of the whole living world, man included, by a process of natural genesis has become widely accepted. Consequently, giving due consideration to the slowness with which men are apt to tackle problems that are remote from their accustomed ways of thinking, it is not to be wondered at that the knowledge-getting and knowledge-using processes which Aristotle investigated on the basis of the relatively stable, static nature which he knew, has not yet been adequately reinvestigated on the basis of the prodigeous generative power of nature as we now know it.

A revised organon of natural knowledge adapted to the conditions of the modern world—that is the task before the learned of our day. What part in it would fall to scientists and what part to philosophers need not at the moment concern us. But Professor Donnan's intimation that the task would be much broader than the terms "science" and "philosophy" as now commonly understood would include, is certain. Certain it is, too, that it is no job to be done by conferences and committee meetings.

It does, however, seem quite likely that such an international conference might do something toward clarifying thoughtful persons on what the issue really is; on what, as touching human good, is at stake; on what, broadly speaking, must be done; and something perhaps on how the task will have to be gone about.

WM. E. RITTER.

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BOOK REVIEWS

Identity and Reality. EMILE MEYERSON. Authorized translation by Kate Loewenberg. New York: The Macmillan Co. 1930. Pp. 495.

Identität und Wirklichkeit. EMILE MEYERSON. Deutsch von Kurt Grelling. Eingeleitet unsw. von Leon Lichtenstein. Leipzig: Akademische Verlagsgesellschaft M. B. H. 1930. Pp. xl + 534.

The appearance simultaneously of two translations of M. Meyerson's *Identité et réalité,* a book which was first published about a quarter of a century ago, is evidence of the increasing interest not only in the philosophy of science, but also in the work of this highly erudite epistemologist. When this volume was printed, the first announcement of the special theory of relativity was in its infancy; Planck's quantum theory was but seven years old; and the discovery of radium—but not its preparation—only nine. Debye's law was not yet born and the Bohr atom was still in the realm of unrealized essences. It was, therefore, still the classical physics which was "science" for M. Meyerson, and his results, even though true of the theories he studied, do not necessarily apply to the physics of today. Before discussing whether they do or not, we should first present the thesis of his study.

There are two sides to M. Meyerson's researches, one the epistemological hypothesis on which they are based, the other the actual findings.

The epistemological hypothesis is that an empirical study of scientific reasoning will reveal the fundamental "laws which rule the human mind" (p. 8, Eng. tr.). Now it is clear that such an hypothesis demands a clear conception of what "science" is and in the thought of M. Meyerson science turns out to be the so-called physical sciences, mathematics, astronomy, physics, and chemistry. Obviously if the biological, historical, and social sciences are omitted from one's investigations, the chances of finding a homogeneous scientific method are greatly increased, and by showing that non-mechanical physical theories and common sense approach physical science as an ideal, M. Meyerson gives at least an *argumentum ad hominem* in favor of including nothing but physical science in his investigations. As a matter of fact, a good, if not conclusive, case can be made out for the very opposite hypothesis, namely, that the physical sciences are now orienting themselves in the direction of the biological and social sciences. But at any rate, in 1930 it would be difficult for anyone to accept without further discussion the guiding rule of the Meyersonian point of view. The most conservative student would insist that at least there are two scientific methods.

Whether they are both to be called "scientific" or not is a question of nomenclature. Were M. Meyerson telling us how we must improve our thinking, he might use his word "scientific" in a eulogistic sense. But since his very thesis is that his studies will show us how we do think, it is clear that the apparent difference between the two kinds of science can not properly be overlooked.

It would also be desirable, were M. Meyerson writing to-day, to justify his claim that the "laws which rule the human mind" are to be found in science. It was easier in 1907 to lay down the "identity of the progress of conscious and unconscious thought" as a heuristic principle. To-day plurality does not annoy us as much as it did our fathers. We should be willing to entertain the possibilities (*a*) that though has evolved—not necessarily growing better, or/and (*b*) that at any one time there are several ways of thinking. This is no place perhaps to introduce reasons for either of these points of view. They should not, of course, be entertained if there is no good reason to entertain them, simply for the sake of being contrary-minded. Yet to-day they do not seem so obviously absurd as they probably did in 1907 and had they been entertained, it is at least possible that different results would have ensued in the volumes whose translations we are reviewing. That they did not seriously occupy M. Meyerson's attention is good evidence of how swiftly philosophy has changed in twenty-five years. For I doubt whether anyone performing the same task to-day would dream of overlooking them.

The outcome of M. Meyerson's study is that two great principles control man's interpretation of nature. One of these he calls the principle of legality, the other the principle of causality. The former of these asserts that Nature is so built that its laws endure. But to have enduring laws means, according to M. Meyerson, that the future will reproduce the past, or better, that time is irrelevant to the occurrence of events. It is that irrelevancy of time which makes prediction possible. The principle of causality is the irrelevancy of time to *things*. Just as the scientist believes that objects can move freely about in space, so he believes that they can move freely about in time without essential change.[1] This principle is foreshadowed in the traditional phrase, *causa aequat effectum*. If the cause equals the effect, both growth and diminution must be explained away and the Lucretian formula, *ex nihilo nihil*, accepted with perfect literalness. It is obvious, moreover, that if the cause is really equal to the effect, then "nothing happens," and the apparent change in a causal process must be explained away.

[1] This, of course, is not strictly true according to the general theory of relativity, but M. Meyerson was writing too early in the twentieth century to discuss that. He takes it up in *La déduction relativiste*.

To explain it away is the task of science. And science accomplishes that task by the "principles of conservation," i.e., the principles of inertia, of matter, of energy, by the elimination of time, and by the unification of matter. The principles of conservation are explained by M. Meyerson as being neither *a priori* nor *a posteriori.* If they were the former, they would have appeared at the birth of science, whereas the appearance of each is dated. Were they *a posteriori,* their empirical proof would be more than approximate. Yet though theoretically physicists can approach as closely as they wish to a complete empirical demonstration of the principles of conservation, yet there is always a gap between the measurements which they "ought" to get and those they do get. These principles are therefore accepted because they are plausible, asserting something which the human mind wants to believe to be true and yet whose truth it can not demonstrate with apodictic certainty. This should immediately raise the question of the relation of mathematics to experience and the nature of the empirical verification of deduced theorems. It should also make one ask exactly what the scientist measures in such verification and whether it is identical with the subject-matter of his laws. In the case of inertia, matter, and energy, it is clear that no one can approach them directly, for they are what M. Meyerson would call *êtres fictifs,* created for the sole purpose of unifying the diversities of direct experience. Might not a positivist object that since such entities are known to be fictions—in one sense of this much abused word—it would be just as well to eliminate them or at least not to found a metaphysics upon them?

The elimination of time is performed by the dogma of reversibility. Reversibility is assured by the causal postulate, *causa aequat effectum,* but as this in science is always expressed in the form of equations, the effect looks as if it were identical with the cause and whatever operation is symbolized by the sign of equality looks as if it were a symmetrical relation. But though physical science does express its theorems often in the form of equations, there are some which result in inequalities, such as the famous second law of thermodynamics. The second law is given a chapter to itself in *Identity and Reality,* a chapter which points out how unsatisfactory it is to scientists and how they have tried to avoid its consequences. But aside from these arguments—whose logical culmination is "two-way time"—there is a theory of change underlying the *causa aequat effectum* formula which need not be too docilely accepted by the twentieth century. This theory comes out very clearly in parts of Aristotle and gives rise to the concept of potentiality, as M. Meyerson sees very clearly in his second book, *De l'explication dans les sciences.* This is the theory that change is the passage

from one entity to another of what we might call "floating qualities," which are about the same thing, I suppose, as Mr. Whitehead's "eternal objects," not to mention Mr. Santayana's essences. On the basis of what is only a metaphor after all, a property to appear in one object or event must have "come from" some other object or event, for it could not have been created *ex nihilo*. The whole trouble lies in the meaning of the words "come from," which illustrates how the metaphor hypostatizes all properties. It is, furthermore, a gross simplification of a causal situation. Hume has instilled in us the habit of speaking of causal series, as if they could be properly symbolized, *a, b, c, d*. . . . As a matter of fact, what most people call a causal incident does not depend upon one variable, but on three, the "cause," the conditions, and the "patient." The effect varies with at least those three and what way have we of making it literally pre-exist in those three? Moreover, which entity you call cause or agent and which you call patient in a causal situation is largely arbitrary—for even when two billiard balls collide, a change occurs in both, not merely in one. It would be more accurate to symbolize causation as vector laws are symbolized rather than as simple linear series. Is there any way of finding a product in either a multiplier or a multiplicand? M. Meyerson's theory of reasoning is largely responsible for this simplification of causality. In *De l'explication dans les sciences* he treats it—following Poincaré—as a *cascade d'équations*. We have a right to-day (*De l'explication* was written, however, in 1920) to question that theory of deduction. I fail to see how the logic of Russell and Whitehead can be "reduced" to equivalences, not to speak of identities.[2] But the theory of the *cascade d'équations* fits in beautifully with the thesis of *Identity and Reality* and if each equation represents a bit of causation, it justifies the thesis that causality is the denial of change and the revelation of identity.

It will be noticed, moreover, that this theory of reasoning and of causation does not question the truth of the Aristotelian theory of the concept or the essence. M. Meyerson in conversation—and no doubt elsewhere—has said that the Aristotelian logic, i.e., what is fundamentally the ontology of Socratic definition by induction, articulates the instinctive reasoning processes of the human mind. Be that as it may, it can only by a perversion of facts be made to square with statistical reasoning, for in a statistical grouping there is no self-identical essence present in all the members of the group. The property in which one is interested varies more or less throughout the group. It is, I think, pretty well agreed that scientific laws

[2] This question is treated at greater length in the reviewer's *Critical Analysis of the Philosophy of Emile Meyerson*, Johns Hopkins Press, 1930.

can not express factors which are not quantitative and no one to-day would identify quantities which are relational with terms. The Aristotelian logic, one might say, was a logic of nouns; "modern" logic is a logic of verbs and though such slogans are often misleading, this one at least orients us towards understanding the essential difference between the two.

With time eliminated, there remains diversity to be explained away. It must be explained away, for as long as it remains, the causal equations are not strictly true. The elimination of diversity appears very clearly in chemistry, in the atomic theory, and in physics as early at least as Galileo. We have unquestionably—in spite of Ostwald—made chemistry more satisfying to the reason by the theory of the elements whose purely spatial arrangements determine the divers traits of the compounds which they form. It would also be a very happy event if an hypothesis like that of Prout's were to be accepted by chemists in general and, in a sense, the "electron theory" is an hypothesis like that of Prout's. M. Meyerson has pointed out that motion in space is neutral to the internal constitution of things according to classical science and that consequently science does not object to differences in spatial conformation as the explanation of differences in experiental properties. But the "neutrality" of space follows from its "homogeneity" and the present reviewer finds it difficult to imagine in what sense of the word the space of the general theory of relativity is homogeneous. Certainly motion through it is held to be highly prejudicial to what M. Meyerson calls the essential property of matter—mass—and certainly the use of gravitational fields in physical theory can not be said to leave space as indifferent to its "contents" as it was in 1907. Hence the drive towards an Eleatic unity of being seems to have been arrested and if M. Meyerson were writing to-day, he might change this point.[3]

It has appeared, I think, that the reduction of causal relations to identity can never be complete. For the equality symbol does, as we have said, take the place of an operation which operation does not appear openly in the equation. This involves a break in the universe between the world of science and the world of experience as complete as the break between the two worlds of Plato. The essential qualities of the world which forms the subject-matter of science are denied in that intellectual discipline whose subject-matter they are.

[3] If he did change it, he would probably have to change his entire philosophy, for the real basis of Meyersonian causalism is in geometrization. This comes out very clearly in *De l'explication*, and in *La déduction relativiste* he seems satisfied that if he can show relativity to be a "reduction" of physics to geometry, he has proved his thesis, *viz.*, that the technique of relativity-physics is not essentially different from that of classical physics.

Thus Meyersonian science denies the "reality" of time, diversity, change, transitive action, sensory qualities, direction. Such properties M. Meyerson calls *irrationals* and if we take his qualification and the theory of reason which underlies it seriously, we must indeed conclude that any subject-matter indissolubly welded to time and variety can not be open to scientific treatment. Thus the biological, social, and historical sciences are forever excluded from the Academy. What are we to do about this? Be satisfied with heaping derogatory adjective upon these disciplines? Admit the existence of two species of science? (But then what happens to the "laws which rule human thinking"?) Ask physical science to reform? It would be perhaps improper in what is only a review of translations of *Identité et réalité* to attempt the answer.

But the question continues to force itself upon one's attention, particularly in view of the increased use of statistics even in physical science. It is obvious that when the physicist starts out by saying that a particle of matter can move in any one of six directions, he abandons the attempt to explain why it should go in one direction rather than in another and thus produces "legalistic" rather than "causalistic" science. One has the feeling that the biological, historical, and social sciences made desirable progress only when they abandoned causalism and stuck to legalism, which became effective by their extended use of statistics. One has also the feeling that physical science is moving in the same direction—certainly in its explorations of the "microscopic" realm. That tendency is unreflected, naturally enough, in *Identity and Reality*, so that the book's main importance, one says in all admiration for its erudition, is historical. The English translator has left her text as she found it. The German has tried to bring it up to date in a series of footnotes. But these footnotes—except possibly in one place (p. 42)—reveal no inadequacies of the text to deal with contemporary as well as with classical physics. That is interesting, since the translator is a much more competent critic of the philosophy of science than his present reviewer. The observations of this review, moreover, are offered not so much as objections, but as an invitation for further enlightenment. For they have seemed to me inevitable if one is to approach the subject with philosophic detachment.

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From Orpheus to Paul. VITTORIO D. MACCHIORO. New York: Henry Holt & Co. 1930. Pp. 262.

This book, by a Privatdocent of Archaeology in the University of Naples, contains the Schermerhorn Lectures in Religion at Columbia University for 1929. It has ten chapters under the following titles:

Greek Mysticism, The Orphic Ecstasy, The Orphic Mystery, The Orphic Creed, The Origin of Orphism, The Conquest of Greece, Orphism and Greek Philosophy, Orphism and Christianity, Past and Future. There are twelve illustrations, mostly reproductions of ancient paintings and bas-reliefs of mystic scenes and ceremonies. There are no foot-notes, but thirty-two pages at the back of the volume are given over to copious references to authorities, arranged by chapters. Finally there is a brief index, covering three and a half pages.

In substance the book represents an attempt, first, to reconstruct the main features of the Orphic religion; secondly, to assess its influence on Greek religion, Greek philosophy, and early Christianity; and thirdly, to suggest the necessity and proper place for mythical and mystical elements in the religion of the future.

For the reconstruction of Orphism, the author ekes out the scanty and scattered references of the ordinary presentable classical authors with a plenteous stock of evidence from what might be called the attic of ancient literature, as well as from archaeological data, anthropology, and comparative religion. This interest in the more obscure antiques, to be quite frank, often signifies a crank; but the reader of the volume under review will find a sane discussion of the material. To be sure, the whole of this material is of such a recondite and esoteric nature that it permits of no more than probable or plausible interpretations, frequently through the medium of some analogy; and the author might have done well to make this plain at the outset. It is perhaps the habit of mind induced by contact with such inevitable vaguenesses that indulges in supergeneralities like the following: ". . . the Greeks had no rigid line of demarcation between the spiritual and the material world . . ."(p. 26); "The distinction between myth and history did not exist at all for the Greeks" (p. 78); "In Plato's mind myth and truth are one and the same thing" (p. 177). There is a kind of intellectual immodesty about such judgments that will make them offensive to a more delicately balanced mind. On the other hand, the author is candid in presenting the evidence for his deductions—the works are exposed, as far as possible; and he is unusually deft in assembling the main parts in such a way that they stand out clearly and in the end give an impression of wholeness. The result is a better delineation of Orphism (always remembering that we are in a region of low probability) than any other that I know.

Orphism lacked the imaginative content to be serviceable for art, which accordingly kept to the state religion; but "philosophy was from its very beginnings deeply under Orphic influences" (p. 166). Although these influences made their first appearance in Pythagoras,

it was Heraclitus who brought them to a dominating position in Greek speculation. "Without doubt he was a pure product of the mystery; his idea of knowledge agreed thoroughly with the mystic process of ecstasy. Rationalism was perfectly alien to him. The source of his knowledge was not reflection but intuition." "His amazing doctrine of the oneness of opposite states and of the eternal passing of things can be explained only in the light of the mysteries" (p. 175). Now I think we must agree with Professor Macchioro (and with Mr. Cornford, *From Religion to Philosophy*) that there was a mystical strain in Heraclitus, and indeed in several other philosophers, that can be connected up with the mystery cults; but I doubt if this strain was as pervasive as these authors believe, and I am fairly clear that its presence did not mean the complete absence of "rationalism." Let us admit that what we call intuition was the source of knowledge for the Ephesian philosopher; still that ought not to warrant us in reading into his system a modern distinction between "emotion" (p. 176) and "reflection" as avenues to truth, and then identifying the emotion with ecstasy. Let us admit again that the oneness of opposites was as mysterious as the Orphic identification of the living and the dead; yet it is certainly not mere mystery. Heraclitus, even more than his great modern admirer, Hegel, has always eluded the efforts of commentators to confine him within any such generous and wholesale classification as is employed by the present author.

The thought of Empedocles and Parmenides had Orphic elements, but the second great step in the philosophic career of Orphism was taken by Plato. "On careful analysis, Plato's philosophy appears to be a purified and enlarged Orphism" (p. 176). Later (p. 180) we are told that "Plato's philosophy appears to be constituted of two different elements: the first one is the Socratic criticism, the second is mysticism." This mysticism (= Pythagoreanism = Orphism) comes out in its purity in the great myths; but it also influenced the critical and intellectual side of the Platonic system, typified in the Theory of Ideas, by furnishing it with a realistic background; and in general, "it played the part of faith toward thought" (p. 183).

The full meaning of these excerpts must, of course, be gathered from a study of the context in which they occur; and they are significant here only as expressions chosen by the author himself for the conveyance of his thought. The old-fashioned historian or philosopher certainly ought to value them as containing fresh and illuminating suggestions for interpretation, but he can not fail to feel certain doubts, the most serious of which will probably be the following. Does it make for historical accuracy to use Orphism as

a generic term for Greek mysticism, so that it can become a predicate for Pythagoreanism, the Eleusinian cult, and the Platonic philosophy? Does it not imply an extreme form of evolutionary doctrine to hold that "the Platonic theory of ideas is to be regarded as the outcome or survival of a very ancient belief which he merely developed and improved" (p. 180)? If one remembers the many passages in Plato's writings where to seem is contrasted with to be, and again the laborious distinctions between opinion and knowledge, and finally the straightforward recognition of error in the *Theaetetus,* would it be a sober and adequate account to say that "the so-called Platonic idealism is only an absolute realism, according to which everything that man thinks is endowed with objectivity" (p. 179)?

Professor Macchioro believes we must assume that there was no interruption in the development of Orphism during Hellenistic times, at least among the lower classes, in order to account for the leading part it played in the making of Christian theology, notably in the work of St. Paul. This rôle is defined by a comparison between the Orphic Zagreus and the Pauline Christ, on the following points: "1. Zagreus is son of Zeus. 2. The Titans kill him. 3. Zeus calls him back to life. 4. He takes him into heaven. 5. He gives him the kingdom. No one would deny that these points agree perfectly with the Pauline Christ, son of God, who was killed, resurrected, ascended to heaven and received the kingdom. The only point of difference is that Zagreus was torn to pieces and Christ was crucified" (pp. 189, 190). Surely in attempting to establish an identity between two such apparently diverse phenomena as Greek Orphism and Jewish Christianity, an author should be most meticulous on these matters. First, the evidence should be carefully weighed and its value estimated. Now if we take point 5 above, we find the only references are to Proclus, who wrote about four centuries after Christ, but who quotes a supposedly Orphic hymn of unknown date and origin concerning Dionysus. From such data several different conclusions are possible, and no one of them could be more than highly tentative. Secondly, the extent of the identity should be clearly indicated. What Proclus says is that Zeus made Dionysus king of the mundane gods. Does this justify the author in saying that Zeus gave Dionysus "the" kingdom and then implying that this metaphor was identical in meaning with that which St. Paul uses for Jesus? Thirdly, and most important of all, suggestions of actual causal connection should be discreetly stated. Granted that there is the agreement which the author believes between Orphic and Pauline doctrines, does he mean to imply that God gave Christ the kingdom because Zeus had given Dionysus

a kingdom? Professor Macchioro could not possibly entertain such a notion. Then does he suggest that Paul supposed God gave Christ the kingdom because the Orphics supposed Zeus had given Dionysus the kingdom? But why need Paul have supposed what the Orphics supposed because they supposed it? If the causal factor was operative at all, might he not have adopted the Orphic expression because he thought it was a good expression for what he already had in mind? In this case, its connection with Orphism would be unimportant in comparison with the fact that it fitted St. Paul's data—he would adopt it, not because it was Orphic, but because it was good. But need there be any causal connection at all—that is, need the fact of resemblance or agreement prove a causal connection? St. Paul might have got the notion from the Apostles, who got it from Jesus, who got it from ancient Jewish sources or invented it for his own purposes; and in this case there would be agreement between St. Paul's phrases and the Orphic hymns, but no causal connection. Does every identity establish causality?

These may be historical and psychological subtleties which the straightforward efficiency of the anthropologist spurns; but as long as he refuses to face them candidly, he can not blame scholars who are cursed with such scruples if they on their part refuse to go all the way with him in concluding that "Pauline theology had an Orphic origin" (p. 201) or that "Christianity is, from a merely historical viewpoint, an enormous Greek hero cult devoted to a Jewish Messiah" (p. 203).

In the final chapter the author discusses in more general terms the value of Orphism as mediating between Judaism and the Greek world by furnishing the myth as the appropriate expression for the divine, the mysterious, and the ineffable elements of experience; and he suggests that religious progress in the future lies along the line of transforming theology into mythology, so that the religious doctrine of God need no longer pretend to be a kind of knowledge but may establish its independent value as a "complex of symbols by which man realizes his faith" (p. 223). It is patent that here are hints of profound interest both to the historian and the philosopher; and though the hints may not be new in essence, their fresh setting gives them a renewed vigor.

Taken as a whole, the book should not be read by old men, because its extreme statements will simply make them angry without doing them any good; nor by young men, because it will intoxicate them. But those of middle age, who have plasticity enough to respond a little to foreign influences and sense enough not to lose their heads, will find the book full of brilliant interpretations and stimulating suggestions.

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The Psychology of Philosophers. ALEXANDER HERZBERG. Translated by E. B. F. Wareing. (International Library of Psychology, Philosophy, and Scientific Method.) New York: Harcourt, Brace & Co. 1929. Pp. x + 228.

Herzberg presents this work as an impartial, inductive study of certain mental traits of thirty eminent philosophers, from Socrates to Nietzsche. With a few questionable cases (Herbart, Fechner, Stirner, Hartmann), the list is fairly enough chosen. His short chapters are well organized and clearly written: the collection of biographical bits is generally interesting and occasionally impressive. But the book is far from being impartial and scientific: the method is faulty, and the data seem picked and sometimes twisted to support a thesis.

In their professional activities, in their handling of money matters, in their relations with women, and so on, the records of the thirty are searched for evidence of abnormality. A few paragraphs at the beginning of a chapter state what the author adopts as normal for the topic in question, and this important part of the problem is handled in a generally off-hand and inadequate fashion. Herzberg's thesis is that the great philosophers, as a group, have been men whose mental peculiarities positively disqualified them for practical life, that they were abnormally inhibited and abnormally sensitive, and that their work should be understood as a substitute activity, an escape into a make-believe world.

Some details of his evidence may be mentioned. There were four unhappy marriages and two separations (one Stirner's) among the fifteen of the group who married; and to indicate the degree of abnormality which this represents Herzberg compares these figures with the fractional percentage of divorced males in Germany in the year 1890. Twenty-two he lists as "diffident in, or unsuited for, social intercourse"; e.g., Plato, who was characterized by "immense egotism and obstinacy," and Leibnitz, who wrote to a friend (when he was 27 years old) that he felt himself seriously deficient in social manners. Among those who were "almost entirely passive" politically he includes Fichte. Plato, Aristotle, and Leibnitz were "clumsy" in their political activities. The writing of poetry, and the development of a strong interest in religion, are also signs, Herzberg argues, of an abnormally inhibited personality: half of the thirty can be convicted of having written some poetry, and most of them were seriously interested in religion. When the field of evidence is made so inclusive one is somewhat surprised to find that the author omits mention of some known and striking peculiarities in several of his individuals, e.g., Hobbes, Schopenhauer, Comte, and Nietzsche.

Another bit of his argument may be quoted. In the latter part of the book much emphasis is laid on the hypersensitiveness of the philosophers. Herzberg remarks that this trait was actually recorded in only a few of the cases in his group, but that very likely the biographers merely overlooked it. This "presumption" is strengthened by the observation that "hypersensitiveness, as everyday experience shows, is often found associated with physical fragility, weakness, or chronic illness. . . . Bruno was pale-faced and slight of build, Bacon as a child was fragile and ailing," etc.

All idealism is to be understood as the make-believe construction of over-inhibited and over-sensitive persons. And as for the materialists (since the true metaphysics is, one infers, a dualism), "the defence of so preposterous a teaching as materialism is a proof of their reactive character, i.e., these philosophers must have felt the need of painting the reality of the physical world in as effective and striking colors as possible in order to drive out a tendency to idealism."

After an earlier chapter to show that the philosophers were a neurotic group he ends with the seemingly not quite harmonious conclusion that philosophy has an important "psycho-hygienic value," being in fact an outlet activity which can save inhibited persons from neuroses. "Thus the magic garden which a powerful spirit has created to shelter it from the inclemencies of life, becomes a public pleasure-ground affording recreation and health to many of life's wounded who have no plot of earth of their own."

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JOURNALS AND NEW BOOKS

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NOTES AND NEWS

We print below the program of the Philosophical Union of the University of California at Los Angeles, for the year 1930–1931.

October 29: "Morality as a Fine Art".....*R. F. A. Hoernlé*
Discussion by *John E. Boodin.*

November: "Tradition and Modernism in Philosophy"
Wilbur M. Urban

January: (Subject to be announced).....*George H. Mead*
Discussion by *H. W. Carr.*

February: "Whither American Philosophy".....*James H. Tufts*
Discussion by *F. C. S. Schiller.*

March: "Racial Prejudice".....*George M. Stratton*
Discussion by *B. C. Ewer.*

April: Student Meeting. Three papers, written by students in the Department of Philosophy and selected on a competitive basis.

April: Symposium: "Reason and Religion."
Speakers: *Theodore G. Soares; Carl S. Patton; J. Hudon Ballard.*

May: Symposium: "The Relation of Education to Public Morality."
Speakers: *Maurice W. Keatinge; Sir John Adams; Ernest C. Moore.*

President of the Union: Dean Charles H. Rieber; Executive Secretary: Professor Clifford L. Barrett, University of California at Los Angeles.

THE JOURNAL OF PHILOSOPHY